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sider us, may retaliate this treatment on the history-books which it was Dr. Bastian's severe fate to wade through; they fill us with a sense of the extremest weariness of the habits of East Asiatic life, and the events of East Asiatic history.

One more matter is mentioned by Dr. Bastian which should always be spoken of when an opportunity occurs. The native governments of South-Eastern Asia find their peoples well stocked with good thriving native vices, which are quite as much as they can conveniently deal with. Under these circumstances they object somewhat to the importation of new ones from abroad, and have therefore endeavoured by law to keep opium-smoking out of the country; but now that we are established in the district of course the opium-houses flourish, and Dr. Bastian's regret is not unfounded, that our otherwise beneficial influence in the country is marred for the sake of the opium revenue.

BROCA ON ANTHROPOLOGY.*

Anthropology is that science which has for its object the study of the human group considered in its *ensemble*, in its details, and in its relations to the rest of nature.

Before this science was definitely constituted, the word anthropology had received several other acceptations, and in point of fact man may be studied from several standpoints. The ancient Greek philosophers were frequently called anthropologists (*ἀνθρωπολογοι*) because they discussed "the nature of man," which, according to some meant the mind, according to others the body. Hippocrates, *περι φυσιος ανθρῶπου*, commences with the following significant phrase, "Those who are accustomed to hear the nature of man discussed apart from medicine will find nothing satisfactory to them in this treatise." The name of anthropology was thus received in a variety of acceptations. With many modern philosophers anthropology is nearly synonymous with psychology, whilst other authors have published under the title of anthropology works relating to descriptive anatomy, to general physiology, or to hygiène. Some dictionaries define anthropology, the description of the human body; others, the natural history of mankind. It is thus seen that it becomes necessary clearly to define the sense of a word which has received so many different acceptations.

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* We propose to publish, in this and in a future number, a translation of the greater portion of Dr. Broca's admirable article on "Anthropologie", which has just appeared in the *Nouveau Dict. Encyclopédique des Sciences Médicales.*

Psychology, anatomy, physiology, hygiène, and even pathology, aid us in the knowledge of man in distinguishing him from other animals in characterising his general and his particular types, but neither of these sciences has any claim to the name of anthropology, since each of these separately only shows man from one point of view. Each of the above has moreover a name universally adopted, and if we think proper from some motive to rebaptise them, we should not give them a name more vague and less characteristic than that by which they are known. Let us add that all these sciences, without excepting psychology, might exist if we had never thought of studying man. Those who cultivate them have no doubt the main object of knowing their own nature. But most of their descriptions might, with some slight variations, be applied to other animals as well as to man; and we know that many great discoveries have been made both by the ancients and the moderns on creatures the zoological type of which differs much from our own. Psychology alone may with some show of reason pretend to the honour of being exclusively a science of man. And yet this appearance is deceptive, because animals possess, according to their respective species, an intelligence in which impartial analysis discovers, in a more or less rudimentary state, faculties and feelings analogous to our own of which we are so proud.

All sciences which concur to give us a knowledge of the nature of man are general sciences; they cannot, without losing their synthetic character and their philosophical scope, be restricted specially to the study of man. And if one of them so mutilated assumes the name of anthropology, it would belie its title; not merely because it makes known to us only a part of man, but it makes it known in an insufficient and frequently an incorrect manner.

It may now be remarked that these different sciences study man only as an individual. Even if by some impossible fusion it be attempted to unite them under the pretext that they relate to the same object, namely, the nature of man, this unique and complex science would still only be the particular history of the individual man, and would leave untouched all that relates to the collective history of the human genus. To give to such a science the name of anthropology would be to run counter to all rules of nomenclature. Zoology does not treat only of the animal, but of the animal kingdom. Ornithology does not treat of a bird, but of the whole class of birds; and in the same way herpetology, ichthyology, malacology, etc., have each for their object the study of a group of beings resembling each other by certain fundamental characters, whilst differing in some characters of minor importance. But humanity, also, constitutes in nature one of those groups where the unity of the fundamental type shows itself amidst innumerable varieties of a secondary character, and it is the science which studies this natural group, that is entitled to the name of anthropology, which no other science can protest against.

Anthropology might in a strict sense be defined "the natural history of man." This definition would not essentially differ from that placed at the head of this article; it would even be sufficiently strict for such who look upon natural history as something more than taxonomy, pure and simple; for the true naturalist does not confine himself to characterise the genera, species, families, etc.; but he studies in each species, and if necessary in each variety, the manners, instincts, mode of life, geographical distribution past or present; and anthropology might altogether, despite the complexity of its domain, find a place in this programme. But if we abstract some species which man has associated with his existence and his history, the remainder has been studied exclusively, or nearly so, in regard to their form and structure, and hence the description of anatomical and morphological characters constitutes the greater portion of ordinary natural history. It is different with the natural history of the human genus. Men by their intelligence, their language, their social and political life, their voluntary migrations, their conquests over nature differ so much from other animals, that in order to commence the study of this exceptional group, the naturalist is obliged to have recourse to a particular mode of investigation; to historical, archæological, and linguistic researches, which do not come in contact with other branches of natural history. To say that anthropology is the natural history of mankind, might in most minds give rise to the idea that it is a purely descriptive science; that it confines itself to distinguish and classify the various races according to their physical type; and this interpretation must be carefully guarded against, and the more so, since there has been a time when anthropology, still in its infancy, was confined with in such narrow limits.

The definition we have thought proper to adopt is more significative, and it has, moreover, the advantage of indicating with sufficient precision the three great series of facts, the reunion of which constitutes anthropology. We may, in fact, bring all the studies relating to the knowledge of the human group under three heads.

1. It is first necessary to determine the position of this group in the series of creatures; a question apparently very simple since the supremacy of man over all other animals is incontestable. It is, nevertheless, very difficult to be an impartial judge in our own case, and the study of this question proves it. Pride, one of the most cha-

racteristic features of our nature, dominates in many minds over the calm testimony of reason. Like the Roman emperors who, intoxicated by power finished by looking upon themselves as demi-gods, so the king of our planet imagines that the vile animal, subject to his caprice, has nothing in common with his own nature. The vicinity of the ape inconveniences and humiliates him ; he is not satisfied with being the king of animals, but desires to establish that an unfathomable chasm separates him from his subjects, and turning his back upon the earth he takes refuge with his threatened majesty in the nebulous sphere of the *human kingdom.* But anatomy, not unlike the slave who followed the car of the victor, exclaiming, "*Memento te hominem esse,*" anatomy disturbs him in this self-admiration, and reminds him of the visible and tangible reality which allies him to animality. The doctrine of the human kingdom is then placed side by side with another not less radical doctrine, which pretends to derive man from the ape, and between these two extreme opinions others arise, which, according to a more or less rigorous interpretation of anatomical characters, present the human group as constituting now a species, now a genus, or a class, or a branching-off of the zoological series. A critical examination of the contradictory arguments adduced in favour of these different appreciations, leads to study on one hand the characters common to man and the animals nearest to him, and on the other to find out such characters as are peculiar to man. It becomes, moreover, necessary to see to what extent these analogies and differences agree with the laws presiding over the serial distribution of the groups called genera, species, families, etc.; to investigate whether the gradation which obtains in a lower scale is preserved in a superior scale ; to mark the distance existing between the highest term of the simian and the lowest term of the human series, and to examine the arguments of those who do not consider that distance impassable. That portion of anthropology which comprises the study of these zoological questions is entitled to the name of *Zoological Anthropology*, and may be defined *the study of the human group, considered in its relations to the rest of organised nature.*

II. The human group once characterised, circumscribed, and classed as a group in its *ensemble*, must then be considered by itself; it must be divided and subdivided, and each of these partial groups must be studied separately. This constitutes *Descriptive Anthropology.* Numerous physiological differences coincide with the physical differences. The muscular force, general sensibility, the degree of the perfection of the senses, specially of sight, hearing, and smelling, the mode of articulating certain sounds, the odour of the perspiration, the power of resisting heat or cold, the pathological aptitudes and immunities, the period of puberty, the duration of female fecundity, etc., all these present in various peoples more or less extensive variations.

Finally, that which varies most is the degree of activity of the intellectual functions, the predominance of such or such a group of faculties, the development of the social condition and perfectibility, that is to say the aptitude, to originate or to receive progress.

Thus, whether we consider humanity as regards the external conformation, or the anatomical, physiological, intellectual, moral and social characters, we find considerable differences among the groups composing it. But, although the modifications of the different orders of characters do not always present themselves abreast, there are some which present a sort of solidarity. Thus, the obliquity and the projection of the face, constituting what is called *prognathism*, more or less black tint of the colour of the skin, woolly hair and intellectual and social inferiority are frequently associated, whilst a whitish skin, smooth hair, an orthognathous face, are usually the appanage of the more elevated peoples of the human series. Consequently, although the serial distribution obtains here as in other zoological groups, with its infinite gradations and degradations, its unions and its anastomoses, it is possible and even easy to distinguish between the innumerable variations of the human type, a certain number of secondary types, around which all these varieties group themselves with more or less precision.

As regards these varieties, they have received the name of *races*, which engenders the idea of more or less filiation between individuals of the same variety, but which neither affirms nor denies the question of parentage between individuals of different varieties. The name *species* implies the solution of the question as regards the diversity of origin; the term *varieties* taken in the special sense attached to it in natural history, would on the contrary imply, that the whole human group forms but one species. From this results the inconvenience of speaking two different languages, according as one is monogenist or polygenist, and that neither of these terms is acceptable to such who look upon the problem of origin as doubtful. The word races, on the contrary, may be adopted by all, and it is for this reason that it is now prevalent.

III. The third branch of anthropology, the last in the logical order of regular scientific evolution, but the first in importance, is *General Anthropology*, which has for its object *the study of the human group in its ensemble.* Here it is especially important to establish a line of demarcation between anthropology and other sciences which treat of man. All, without exception, furnish to general anthropology numerous facts, without which it could not exist. They make known to us the individual man, and it is clear that a collection of individuals cannot be studied in its *ensemble* if we did not commence with the study of the individual type which forms the unit of the number. But general anthropology only borrows from the other sciences that which concerns man considered as forming part of a group. Some examples are necessary clearly to explain this distinction.

The study of the cerebral functions forms part of physiology. Those, for instance, who search for a certain relation between the volume of the brain and intellectual power, study a question which thus put is purely physiological. But if, instead of confining the comparison to individuals resembling each other by their physical characters, and differing in intelligence, we compare a series of individuals of a certain race with a series of individuals belonging to different races; if, in addition, we place the results of this anatomical parallel by the side of those notions we possess concerning the relative intelligence of these different races, we quit the territory of pure physiology and enter the domain of general anthropology, just as in treating of a subject of zoological anthropology, we study the same question with the object of establishing a parallel between man and the rest of animals. The description of the skeleton, the muscles, nerves, viscera, skin, etc., belongs to anatomy only; that of individual varieties equally so. But whenever an organ, either in form, structure, or volume, presents differences in various races, the history of these variations belongs to the comparative anatomy of races which is frequently put under contribution by ethnology, but which study in its *ensemble* belongs to general anthropology.

The study of cancer, tubercular affections, dysentery, yellow-fever, etc., forms part of pathology; but when the pathologist states that either of these diseases presents, according to race, differences in frequency, gravity and progress, and these differences cannot be explained from external conditions, but must be referred to the organisation of the respective races, he contributes to the progress of the comparative pathology of races which forms part of general anthropology.

Hygiène, which has for its object the preservation of health, is not a branch of anthropology. Even public hygiène, although it embraces questions relating to the health of a whole people or of a great number of peoples, is perfectly distinct from anthropology. But the hygienist, by studying the conditions favourable or noxious to the health of individuals or masses, is obliged to inquire how far the influence of media is capable of modifying the organisation; how far these modifications of the individual by external conditions may be capable of transmission from generation to generation, and these two questions form an integral part of the problem of races, one of the the most important of general anthropology.

The psychologist, who studies in himself or in other individuals the faculties of the mind, the feelings and passions, is not an anthropologist; but who, extending the field of psychology, observes the differences existing between peoples and races in reference to intellectual power, perfectibility, sociability, artistic, scientific, literary, industrial, religious and political aptitudes, he participates in the work of anthropologists, and it is thus that the comparative psychology of races becomes one of the most interesting branches of general anthropology. It is unnecessary to multiply examples to show how general anthropology puts under contribution all sciences which have man for their object, without being confounded with these sciences.

Anthropology even borrows from sciences altogether foreign to the study of the individual man, but which still furnish facts concerning man as members of a zoological group. Climatology indicates the condition of the various media in which man can exist; zoological and botanical geography make known to us the existence and the distribution of distinct *Faunas* and *Floras*, of multiple centres from which the actual species sprung, contrary to a general prejudice which derives if not all plants, at least all animals, from one focus; and it is at once perceived how important the knowledge of this fact is for him who inquires whether the human genus had only one or several cradles.

Geology, in its turn, describes the gradual changes which have so many times modified the conditions of life on the globe, and makes us appreciate the immense time which must have elapsed between their different epochs, and the great antiquity of the quaternary strata which contain the remains of man or of his handiwork. And palæontology, finally placing man by the side of species he has survived, reveals to us the conditions of the existence of man in those primitive times, the record of which is lost.

General anthropology, towards which so many other sciences converge, embracing within its immense domain subjects of different orders requires different modes of investigation. The methods it adopts for the discovery of truth, are for each subject borrowed from the corresponding science, but as regards complex questions which encroach upon several sciences, and for such as belong to her properly, anthropology must follow her own principles and her own methods. We must dwell a little upon this point.

In truth anthropology, being a science of observation, has no other method than that of other sciences of the same family. But the modes of investigation vary according to the nature of the facts we desire to ascertain. Now the facts of anthropology are relative to collections of individuals and not to isolated men. In every race, in every family, there are individual variations, establishing sometimes between two brothers greater differences than such as exist between two men belonging to different races; it is therefore indispensable to have recourse to such means of observation as shall obviate such a cause of error.

Two rocks must here be avoided. On the one hand, in endeavouring to determine the characters of a race, particularly in more or less exceptional cases, must not be capable of altering the general description. Nevertheless, on the other hand, if it be necessary to ascertain the mean type of a population, it is at the same time requisite to ascertain the maximum and minimum of each character were it only to learn whether it is a pure or a mixed race. Thus, even if it were possible to discern at first sight the individuals differing by one or several characters from the general type of the race, they must not be excluded from observation, since the study of these divergences forms an integral part of the description of that race; hence the necessity of collecting a large number of observations, and to have recourse in the determination of each character to exact and uniform notations in order that the comparison of individual observations might yield methodical statements expressing the averages, maxima, minima, and if necessary, many other divisions. In order to effect this we ought to endeavour as much as possible to express by numerical signs the characters observed in each individual; this is easy when, for instance, the length or absolute volume of an organ is to be stated. The results of such observations can then be stated in precise numbers easy to be calculated. The characters which cannot be determined by simple and direct measurement, may still in most cases be formulated either by indirect measurement, to which we shall recur, or by conventional notations. Thus, for instance, the shades of the skin, eyes and hair, despite their infinite diversity, may be reduced to a certain number of types or rather marks, represented on a chromatic table on which the graduated colours are respectively numbered. Thus, also, may the degree of the projection of an osseous protuberance, like the occipital protuberance, be expressed by progressive numbers from 0 to 5, whilst the degree of opening or fusion of the cranial sutures may be numbered from 0 to 3. These notations are conventional. It is clear that if zero expresses the total absence of the occipital protuberance, or of the suture, the number expressing the maximum development of either, is an arbitrary selection, as regards the number of intermediate conditions which it may be desirable to signalise. But if the convention be accepted, the observations may be collected with sufficient precision and applied to methodic statements which, with some necessary precautions, may become statistical.

Indirect measurements, of which we have spoken, relate to the determination of certain angles, fictitious lines, and certain proportions. These are chiefly employed in the study of the head and the cranium. Sometimes, for the appreciation of the relative development of various cephalic regions, we measure the inclination of two lines or planes, sometimes by the aid of certain graphic processes, we construct point by point, curves afterwards subjected to geometrical constructions, the elements of which are measured by compass and the goniometer. The linear or angular measurements thus obtained, in which cyphers express the proportions of the two lines, readily submit to statistical calculation. But in order that these varied statistics should be well composed, it is above all things necessary that all observations should be collected according to a uniform process. In seeking for an explanation of the contradictory results published by different authors, we almost invariably find it in the diversities of their processes, or in the uncertainty of their marks. Nearly all the measurements may be taken by different methods. What, for instance, is the length of the arm? What are the points of the marks for this measurement? For one, the superior point of mark is the point of the acromion; for another, it is the inferior border of the great pectoral muscle; for a third, it is the most elevated part of the armpit. The inferior mark point has been alternately placed on the epicondyle, the epitrochlea, the small head of the radius, the summit of the olecranon, whether the forearm be stretched or bent. To these uncertainties must be added such as result from the position of the arm, for the same process of mensuration applied to the same individual may present a difference of more than a *centimètre* according as the arm is approached to, or moved from, the trunk. It thus becomes indispensable to adopt for each measurement a constant and invariable method sufficiently simple to be employed by all observers.

It is generally admitted that the method of averages, based upon a large number of individual facts, is the only one leading to an exact knowledge of a group of individuals. It has been asserted that all this apparatus of measurement and cyphers is unnecessary, and that it is sufficient to measure in each race a small number of individuals selected *with discrimination*, as being the representatives of the mean type of a race. We readily admit that a very sagacious and much experienced observer, gifted with such particular aptitudes as constitute a good artist, may, without much error, distinguish amongst the mass such individuals, generally not very numerous, who in themselves present a harmonious *ensemble* of the characteristic features of their race. Still such appreciations can never be absolutely rigorous, being entirely subordinate to the qualities peculiar to the observer.

The dates they furnish are merely personal; they are neither demonstrable nor can they be discussed; they may be received with confidence—a confidence frequently justified—but it leads to accept as true, delusive facts; and it tends, moreover, to the restriction of sources of information, to adopt a method, the appreciation of which can only be successfully made by a select few of observers. The facts required by anthropology must be collected from all parts of the world, and with precision by all kinds of educated travellers. The method of individual observations, by means of simple and uniform processes, sheltered from the flights of fancy and repeated upon a large number of individuals taken at hazard, is thus the true basis of anthropological investigations.

This method is, however, only applicable to the facts of the anatomical order. But statistics, of which it is only a particular form, plays in anthropological studies a more general part. A large number of questions find in it a solution it would be vain to look for elsewhere. Statistics alone can demonstrate whether a race is progressing, in *statu quo*, or decaying. Some unquiet and chagrined minds have with complacency accepted a report propagated by our trans-Rhenan neighbours, that the French population, despite its numerical increase, has for some sixty years past degenerated. Some attribute this to the development of industry; others to social revolutions, to vaccination, to the large consumption of potatoes, to tobacco, to alcohol, to universal misconduct; others invoke a real cause and worthy of the attention of the legislature, namely, that the mode of recruiting the army condemns the tallest and healthiest males to a seven years celibacy, whilst the short and less robustious males marry and transmit to their offspring their defective organisation. There are also some, who accuse civilisation in general as violating nature and thus gradually tend to the decay of humanity. Of these various hypotheses some are altogether paradoxical, others puerile; some are founded upon grave facts, although too partial to seriously affect a population of thirty-nine millions of men. We must, however, before all, in order not to discuss the history of the golden tooth, ascertain whether it be true that since the beginning of this century height has diminished in France, and statistics alone can answer this question. This has been done by M. Boudin, and he has demonstrated that from 1831 to 1860, the only period of which we possess precise and complete documents, the height of the conscripts has been continuously on the increase.

The decay of a race, which must not be confounded with degeneration, for the latter may be compatible with a numerical increase, whilst the former is characterised by a continued diminution of births, or the continued increase of mortality. This decay of a race cannot be measured, and frequently cannot even be revealed by statistics. When, for instance, the population of a colony increases, we are apt to conclude that the immigrant race is prospering, whilst in many cases it only maintains itself by constant reinforcements. Statistics, by comparing the number of births with that of deaths, destroys such illusions, and thus we arrive at the solution of the question acclimatisation or non-acclimatisation of certain races in certain climates. It has thus been demonstrated that European races cannot maintain themselves in Africa and tropical Asia, and doubts have even been raised as to the possibility of colonising certain parts of Algeria by Frenchmen. Here, again, it is by the aid of statistics that we are enabled to appreciate the influence of race and climate on the duration of life, the comparative frequency of the principal diseases, and specially such as cause the greatest mortality. Statistics, finally, is a means of studying the effects of consanguinity; but here the subject is so complex that we must have recourse to other sources of information.

There are a great many questions of a still more complicated nature, which do not lend themselves to the application of rigorous methods. We need not on that account renounce giving them a scientific solution, but an increase of difficulties requires an increase of caution. The uncertainties arise chiefly from the multiplicity of elements combined in each case under consideration; various influences which have, or might have, concurred in producing a definite result. The mind then indulges in various hypotheses, and feels disposed to adopt that which accords with a preconceived doctrine; but it ought to resist such a tendency because facts are not subordinate to doctrines, but doctrines are subordinate to facts. When a physiologist finds himself in the presence of a complex phenomenon which gives rise to various hypotheses, he has recourse to the analytical and experimental method. He considers one by one the various conditions of this phenemenon, isolates them by vivisection or any other process, he successfully eliminates the false hypothesis, and finally succeeds in finding a true explanation. Anthropology must follow the same principles; it cannot apply them in the same manner, as neither a race nor a collection of human beings can be subjected to scientific experiments; but he profits by the experience derived from all parts of the globe, where immigrations, conquests, revolutions of all sorts, more or less modify the conditions of life. When he searches for the interpretation of a fact, he unites and compares all the analogous facts, produced in different places, under different conditions; he analyses these conditions, then eliminates all the explanations not applicable to the entire series of similar facts; he more and more simplifies the question until the solution is derived from this analysis.

[*To be continued.*]

THE PRIMITIVE PERIOD OF THE HUMAN SPECIES.*

By CARL VOGT.

It is proper that, in a new organ for the natural and primitive history of man, the starting point from which it proceeds should be well fixed and in outlines, at least, the position defined, which science occupies in relation to certain questions. It cannot be our purpose here exhaustively to treat a subject still under investigation. Our object is rather to seize some prominent facts which may serve as boundary-stones, between which the subordinate results may be arranged. We cannot conceal from ourselves that such a selection presents difficulties, since on the one hand the number of discoveries daily increases—nay, owing to the extraordinary zeal with which the investigations are carried on, they swell to an enormous mass; whilst on the other hand facts apparently insignificant come to light, which by subsequent discoveries acquire the greatest importance. Here, it must also be confessed, our knowledge is, more than on other questions, patchwork, so that in arranging the results we in some degree resemble the artist who is engaged in re-arranging the scattered little variegated stones of a destroyed mosaic pavement. It cannot fail that in such a work many errors of association must occur, and that a recovered missing stone may upset the whole combination. But such cases are also instructive, inasmuch as they invite us to caution and to close examination.

My purpose at present is to treat of the oldest documents we possess relative to the existence of man, without reference to periods approaching historical events. I therefore, putting aside the so-called bronze-period, shall exclusively speak of the stone-period, during which stones, wood and bones were the three chief materials of which implements were constructed. I do not so much purpose to cite the facts, as critically to examine, how far the findings are trust-

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* This article is a translation from the *Archiv für Anthropologie*, and we have given it a place in our pages as a specimen of what our admirable contemporary is publishing.—EDITOR.